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The Extent of Autism Knowledge of Novice Alternatively Certified Special Education Teachers in Texas

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An increase in the prevalence rate of autism is not necessarily matched by a concurrent increase in the rate of highly qualified special education teachers, resulting in chronic teacher shortages in this area. Alternative certification (AC) is used as a mechanism to alleviate the demand for highly qualified special education teachers. However, AC routes have often left novice teachers underprepared for teaching students with autism, more specifically in the implementation of evidence-based practices necessary for instructional effectiveness. The purpose of the study was to assess the knowledge of novice AC teachers in the area of autism intervention and to determine the extent to which demographic, educational and professional factors predict the variance in knowledge scores. Data were collected through an electronic survey instrument disseminated to all novice (i.e., first-and second-year) alternatively certified special education teachers in the state of Texas. Results indicated that AC teachers were not adequately knowledgeable about autism and the largest predictor of autism knowledge was hours engaged in self-directed learning. Implications for improving the quality of AC programs in Texas are discussed.

Keywords: personnel preparation, alternative certification, alternative routes to certification, special education, autism training, autism spectrum disorder

Autism is a developmental disorder characterized by impairments in social interaction skills, verbal and nonverbal communication, and repetitive and restricted patterns of behavior. These deficits are manifested in children with autism in a variety of ways that adversely affects pragmatic communication, social engagement with others, academic performance and the overall quality of life. These characteristics persist throughout the lifespan, necessitating delivery of early intervention and high quality instruction in school by professionally prepared teachers, to enable children to grow into adults who will function as independently as possible.

The Centers for Disease Control (CDC, 2015) recently estimated that 1 in 68

children are diagnosed with autism. Autism is considered to be the fastest growing classification category for students receiving special education services in public schools (Ludlow, Keramidas, & Landers, 2007). Even in Texas, the prevalence rate appears to follow the national trend. During the 2014-15 school year, the number of students diagnosed with autism (n = 49,799) surpassed the number of children with intellectual disabilities (n = 43, 228) to become the fourth largest special education classification category (Texas Education Agency, 2015). However, the increased prevalence rate for autism does not appear to parallel increases in the number of certified special education teachers needed to provide high quality educational services to students. In the 2014 school year, proportionate to 49,799 students with autism, there were only 2,336 traditionally certified (TC) and 4,350 alternatively certified (AC) special education teachers in Texas (Texas Education Agency, 2015), indicating a severe shortage in the number of trained teachers.

The Texas State Board for Educator Certification and the Texas Education Agency (TEA, 2013) indicated an increasing enrollment trend for AC or post-baccalaureate participants and a decreasing trend for TC participants in teacher preparation programs since 2006. Although there are basic requirements for special education AC programs in Texas, there is a tremendous variety in the nature and amount of training provided by each of these entities even though they are all approved by the state.

Texas requires that all educator preparation programs (EPP) adhere to specific requirements when developing an AC or TC program for general and special educators. TEA publishes and maintains the approved EPP list. AC programs are run by five entities including universities/colleges, education service centers (ESC), community colleges, local school districts or schools, or private organizations/businesses. The Texas Administrative Code §228.35 stated that all EPPs must provide preservice teachers with a minimum of 300 clock-hours of coursework and/or training (Texas Education Agency, 2008). At least six clock-hours of coursework must be devoted to test preparation, a minimum of 30 clock-hours of field experience (of which 15 hours may be provided through electronic transmission or technology-based equipment), and 80 clock-hours of coursework and/or training. The curriculum of each program must incorporate scientifically-based research which aligns with the Texas Essential Knowledge and Skills (TEKS; TEA, 2008). EPPs are free to choose how the remaining hours are divided. Finally, prior to the completion of the EPP and before becoming certified, individuals must complete all coursework or training.

Educator preparation programs provide field-based experiences in the form of an internship, student teaching, or clinical teaching. Student or clinical teaching lasts a minimum of 12 weeks whereas an internship lasts for one academic school year. A preservice teacher completing an internship must have at least two formal observations during the first semester followed by one formal observation during the second semester, whereas someone completing student or clinical teaching must have at least three observations during their 12-week assignment. These are the minimum requirements of the State with no specification regarding the quality of the training and the extent of preparedness of novice special education or autism teachers.

One of the major concerns in the preparation of teachers of students with autism is the lack of professional standards

regarding the quality and quantity of training (Scheuermann, Webber, Boutot, & Goodwin, 2003). Currently, certification trends support non-categorical licensure to encourage special educators to meet the needs of a wide variety of students. One of the problems with non-categorical licensure is that special education teachers may lack in-depth knowledge and competencies to work with categorical groups such as students with autism (Barnhill, Polloway, & Sumutka, 2010). The National Research Council (NRC, 2001) indicated that one of the weakest components of effective programming for children with autism is highly qualified personnel (p. 225). While personnel graduating from traditional teacher preparation programs may have received intensive coursework and supervised field experiences in teaching students with low or high incidence disabilities, they too may not have received advanced training in specific categories of disability (e.g., autism), making them vulnerable as first-year teachers. The challenges experienced by AC teachers are even greater especially when training is delivered through the fast-track with little or no supervised field experiences.

A fast-track AC program requires individuals to complete several weeks of training during the summer and obtain a teacher of record position for the adjacent school year (Darling-Hammond, 2009). Not all AC programs use the fast-track route; some are extremely similar to a traditional teacher preparation program (Humphrey & Wechsler, 2007) providing regular course work and field experiences. However, novice teachers certified through fast-track AC programs are underprepared to meet the unique needs of students with autism (Cascella & Colella, 2004; LeBlanc, Richardson, & Burns, 2009; Scheuermann et al., 2003; Simpson, Mundschenk, & Heflin, 2011) and more likely to resign compared to other special educators in the first three years of teaching (Robertson & Singleton, 2010).

As the number of students with autism rises throughout the United States, novice special education teachers, regardless of the certification route, need to be adequately prepared to meet the educational challenges of serving students with autism (Bellini, Henry, & Pratt, 2011). This is particularly true for novice teachers who are certified through alternate routes given that the majority of their training is focused on non-categorical special education programs and policies.

AC programs provide a means of entering the teaching profession without having to attend a traditional undergraduate teacher preparation program (Feistritzer, 2011). Many AC programs were developed to address the need to recruit and retain high quality teachers in urban areas (Ng, 2003; Schonfeld & Feinman, 2012) or accept challenging positions as in special education (Ng & Thomas, 2007; Rosenberg, Boyer, Sindelar, & Misra, 2007). Additionally, AC programs were established to increase the number of male and female minority teachers (May, Katsinas, & Moore, 2003). Because so many AC programs are created to meet the market demands of the local school districts, they vary tremendously in recruitment strategies and standards (Brindley & Parker, 2010). Many AC programs do increase the supply of classroom teachers, however, they are at risk for preparing candidates with little understanding of pedagogy, a lower set of skills in classroom and instructional management, and lack of knowledge of issues related to socio-academic development of students (Nagy & Wang, 2007).

Participants entering an AC program have vast life experiences and knowledge which enables them to access their previous learning and construct new knowledge as they progress through the program (Dai, Sindelar, Denslow, Dewey, & Rosenberg, 2007; Knowles, 1984). This belief constitutes the theoretical framework needed for understanding how candidates in AC programs learn new knowledge. This conceptualization assumes that teachers may self-direct new learning and apply previous learning based on current situational demands.

Theory of Adult Learning

Andragogy as "the art and science of helping adults learn" (Knowles, 1984, p. 3) formed the theoretical framework for this study. Andragogy is based on five assumptions about adult learners: (a) knowledge of self which can direct own learning; (b) accumulated life experiences which can be drawn upon as a basis of learning; (c) learning needs that are directly related to changing social roles; (d) problem-centered learning with immediate application of knowledge; and (e) intrinsic motivation that advances their learning (Merriam, 2001, p. 5). Individuals draw upon previous life experiences in order to add and construct new knowledge for directly solving or alleviating immediate problems. This framework applies directly to AC program participants as they transition into teaching positions and use self-directed learning to solve immediate problems or to gain vital information needed for survival (e.g., understand why children with autism also have sensory disorders and how to effectively program for these deficits).

Based on these assumptions, Knowles, Holton, and Swanson (1998) created the andragogy in practice model for designing programs for adult learners. This framework describes external factors which affect adult learning including: (a) goal and purpose of learning; (b) individual and situational differences; and (c) individual, societal, or institutional growth. The goals shape the learning experiences of individuals. As adults begin to learn and apply new knowledge, they experience individual growth which in turn leads to institutional and societal growth and improved outcomes for all concerned.

Learning specialized instructional skills necessitates intensive training and supervision, particularly for teaching students with autism, who are at a greater risk for social isolation and restrictive placement because of the nature of the disability. Due to the specific learning needs and characteristics of students with autism, it is vital that special education teachers are knowledgeable about the disorder and skilled in implementation of specific evidence-based practices (e.g., social-communication skills training, positive behavior supports, visual supports, etc.). Many novice special education teachers in fast-track AC programs, will most likely be underprepared to teach students with autism. This is because disseminating critical content knowledge and coaching teachers on pedagogical skills can be a daunting task even for established AC programs, let alone expedited programs (Darling-Hammond, Holtzman, Gatlin, & Heilig, 2005; McLeskey & Billingsley, 2008). Yet, this area has not received sufficient research attention beyond studies pertaining to the knowledge of multidisciplinary professionals.

The first published report of assessing the knowledge of individuals regarding autism was presented by Stone (1987). She had developed an instrument called The Autism Survey with 23-items, which was administered to professionals representing the fields of clinical psychology, pediatrics, school psychology, and speech-language

pathology to assess their knowledge of and beliefs about autism. The results indicated that many of the personnel had misconceptions about autism such as not being able to differentiate it from other conditions like childhood schizophrenia. Results also indicated that many professionals such as pediatricians, clinical psychologists, and school psychologists perceived autism to be a temporary condition that could be cured while speech-language pathologists perceived it to be an emotional disorder.

Several replications or extensions of Stone's original research have assessed the knowledge of multidisciplinary professionals who work with individuals with autism (Cascella & Colella, 2004; Heidgerken, Geffkin, Modi & Frakey, 2005; Schwartz & Drager, 2008). An assessment of 82 speech-language pathologists (SLP) regarding their general knowledge of autism and communication disorder was conducted by Cascella and Colella (2004). Of all of the interventions, a majority of SLPs rated themselves as knowledgeable with regard to the social communicative approach and social stories. Although many of the SLPs indicated they had previous experiences working with students who had autism, a majority of them indicated being minimally to somewhat experienced in utilizing research-based interventions.

Replicating Stone's research with hospital personnel, including professionals employed by the Center for Autism and Related Disabilities (CARD), Heidgerken et al. (2005) measured the beliefs of 111 participants from a hospital at the University of Florida. They found that participants in this setting had more outdated beliefs about autism compared to participants employed at CARD. In general, most participants did not indicate a need either for additional training for themselves, or for special education services for children with autism. In another study, Schwartz and Drager (2008) assessed the knowledge of 67 SLPs from 33 states throughout America. Their findings indicated that only 21% of SLPs believed impairments in social interactions were necessary for a diagnosis of autism. Although communication impairment is a crucial characteristic for the diagnosis of autism, 85% of the SLPs did not believe the student had to have a communication impairment to be diagnosed with autism. In general, the knowledge of SLPs regarding the characteristics of autism was greater than their knowledge about the diagnostic criteria.

Further, Bakare et al. (2009) utilized the Knowledge about Childhood Autism among Health Workers (KCAHW) questionnaire to assess the knowledge of autism of 134 healthcare workers in Nigeria. Results indicated that workers who had previous experience with children with autism had greater understanding of the nature of autism when compared to workers who had no previous experience. In addition, two predictor variables, age and experience of participants, appeared to be correlated to higher knowledge scores. Results showed that healthcare workers in their 40s and those who treated children in specialized areas such as psychiatric facilities had higher scores on the test of knowledge of autism.

Continuing this line of research, Igwe, Bakare, Agomoh, Onyeama, and Okonkwo (2010) administered the KCAHW to 300 final year undergraduate students attending the University of Nigeria and enrolled in the departments of medicine, nursing science, and psychology to assess their understanding of autism. Authors found that medical students were more likely to be knowledgeable about the

characteristics of autism, followed by students in nursing and psychology. Knowledge of autism was directly correlated with both the number of weeks the undergraduates spent working with children with autism and the number of lecture hours attended. Higher durations for both were correlated with higher knowledge scores.

As is evident from a review of existing research, while the knowledge of multidisciplinary professionals regarding autism has been assessed, there are no studies that have specifically evaluated the knowledge of AC special education teachers in the area of autism.

Significance of the Study

The state of Texas certified 13,668 general and special education teachers through AC routes during the 2007 school year, which was the highest number of persons certified through an alternate route in the country. Although there are basic requirements for special education AC programs in Texas, there is a tremendous variety in the nature and amount of training provided by each of these entities even though they are all approved by the state (data available from the authors upon request). Thus, it is difficult to determine which of these entities prepare highly qualified AC teachers and which of these routes are the most effective and efficient for delivering autism training. With AC being the predominant route to certification in Texas, it is crucial that the various entities continue to strengthen the quality of their programs each year. Thus, there is a need to study the relation between the extent of preparation by AC programs and the knowledge of AC teachers in the area of autism.

Aim of the Study

Even though it is common knowledge that there is a need for highly qualified teachers of students with autism, no studies to date have assessed the autism knowledge of novice AC special education teachers in Texas. The aim of this study was to assess the knowledge of novice AC teachers in the area of autism education and to determine the extent to which demographic and training variables predict the variance in knowledge scores.

Professionals in the field state that teachers are considered to be novice during their first 3 years of teaching (Casey, Dunlap, Brister, & Davidson, 2011), whereas others pontificated that experience, not technical knowledge, determines teaching effectiveness (Darling-Hammond, 1997). For the purposes of this study, novice teachers had less than 3 years of teaching experience since receiving certification. The specific research questions were as follows:

1. To what extent are novice special education AC teachers knowledgeable about autism?
2. To what extent do age, credit hours of instruction, formal hours of instruction, amount of professional development, hours of self-directed learning, and number of students with autism predict the variance in knowledge scores of special education AC teachers?
3. What difference does delivery of instruction (i.e., online, face-to-face, or blended), previous autism experience, and current teaching assignment have on autism knowledge scores?

Method

Participant Recruitment

Multiple strategies were utilized to recruit a large sample utilizing a population frame of all special education AC teachers in Texas. The TEA does not disseminate the names and contact information of individuals certified through the state

programs for reasons of confidentiality, therefore other recruitment methods were utilized. First, 40 directors of approved AC programs in Texas offering special education certification, were contacted via e-mail. They were asked to forward the survey information including a URL link, to their recent graduates and participants who completed their AC program during the previous school year. Each person was contacted individually to recruit participants. The 700 individuals contacted in Texas consisted of the following: 40 directors of AC programs, 20 ESC autism consultants, 12 ESC AC program directors, 47 coordinators of post-baccalaureate programs at universities or colleges, 537 special education directors and 22 graduates of a post-baccalaureate program in Texas. The link to the survey was directly sent to them for completion with a request to forward it to other novice AC special educators. Furthermore, a message inviting novice AC teachers to participate in the study was posted on *ProjectShare*, a professional communication website for state-wide educators. Lastly, 21 messages were posted on Twitter and Facebook pages of AC programs or ESCs.

Several steps were taken to ensure a high response rate from participants. First, EPP directors were sent an e-mail 1-week prior to the dissemination of the survey to explain the purpose of the study, requirements of the participants, the source for obtaining the director's e-mail address, and to alert the directors that they would receive the survey shortly. Next, the initial link to the survey sent to the directors through e-mail included an explanation of the study, the target population of the study, the time needed to complete the survey, and the completion date of the study. E-mails with these components have been shown to increase the response rates of participants (Fan & Yan, 2010; Kaplowitz, Lupi, Couper, & Thorp, 2012). A total of 6 follow-up e-mail notices were sent to AC program directors and autism consultants.

In addition, special education directors in the state of Texas were contacted three separate times in order to enlist their participation in forwarding the recruitment e-mail with the URL link to the questionnaire. Social media outlets were used three separate times as well. The questionnaire was disseminated via an Internet hyperlink for the survey hosted on Qualtrics, a web-based platform for creating and distributing questionnaires to potential participants.

Sample. Even though the TEA website documented 1800 novice special education AC teachers during that year, only 124 teachers responded to the questionnaire. However, 88 of these respondents did not meet the inclusion criteria due to: (a) not being novice teachers; (b) not having taught a student with autism during the last 2 school years; (c) not certified in Texas, or (d) not completed the entire questionnaire. Thus, only 36 novice special education AC teachers met the inclusion criteria and participated in the study.

Dependent Variable

The dependent variable was the score on basic and factual knowledge of autism as tested through the questionnaire disseminated to and completed by the respondents.

Instruments. The 50-item questionnaire was modified from the *Knowledge about Childhood Autism among Health Workers* (KCAHW) instrument developed by Bakare et al. (2008). The adapted instrument with five sections took 20-30 minutes to complete.

Section I. The demographic data (items 5-7) included age, gender, and ethnicity.

Section II. The educational background (items 8-20) sought information regarding highest degree, the specialization area for each degree, name and type of the AC program, method of content delivery (i.e., online or face-to-face), previous coursework specific to autism, number of hours specific to autism provided by the AC program, number and types of professional development workshops taken after certification, graduate certificates and/or degrees pursued, and suggested changes to the AC program in relation to autism courses.

Section III. The professional background (items 21-29) included questions relating to the ESC region of the participant associated with professional development activities. In addition, participants were asked to identify the number of students with autism they taught during the previous two academic years and their past experience working with the population.

Section IV. This section addressed the knowledge of AC special education teachers regarding autism (items 30-47) and included true/false and multiple choice questions relating to the specific characteristics of autism. Specific wording of the questions was revised from the KCAHW (Bakare et al., 2008) to make it more precisely applicable to special education teachers.

Section V. The Texas Autism Supplement questions (items 48-50) related specifically to the supplement required by the state in all Admission, Review, and Dismissal (ARD) meetings of students diagnosed with autism. Topics in this section included type of daily schedule, extended school year service, and student-teacher ratio, usually indicated on the supplement. In addition, participants were asked to identify evidence-based practices (EBPs) for teaching students with autism, from a list of popular teaching methods that included both EBPs delineated by the NAC (2009), and other methods (e.g., facilitated communication, gluten and casein free diet, and equine therapy) not considered to have empirical evidence of effectiveness.

Prior to dissemination, the questionnaire was e-mailed to nine experts in the field of autism spectrum disorders and teacher training to evaluate the content of the questionnaire. They were asked to review each question and state whether it should be kept, modified, or deleted with consideration to the purpose of the study. Five experts including Drs. Brenda Scheuermann, Michael Morrier, Dorthea C. Lerman, Amanda Boutot and Mirah J. Dow returned the questionnaire with recommendations. These modifications were subsequently incorporated in the final instrument before dissemination. The data collection period spanned 17 weeks from recruitment to termination of the web link that hosted the questionnaire.

Data Analysis

Data were exported from Qualtrics to a computer hard drive for coding and entry into the SPSS software (IBM Statistics) for hypotheses testing. A descriptive analysis was conducted to provide information on the demographic background factors of participants. A multiple regression was performed using knowledge scores as the dependent variable and age, credit hours of instruction, formal hours of instruction, amount of professional development, hours of self-directed learning, and number of students with autism as the predictor variables. Variables that did not contribute to the variance in knowledge scores (e.g., age, formal credit hours of autism

instruction) were removed as predictor variables. In addition, in order to evaluate the difference between nominal and ordinal items on the questionnaire, a multi-way analysis of variance (ANOVA) was performed.

The multiple regression analysis involved beta (β) weights, *p* values, and squared structure coefficients to assist in the analysis of the results. By using beta weights, each variable's contribution to the overall variance of the regression model was identified (Courville & Thompson, 2001). Even though the use of *p* less than 0.05 is typical to determine statistical significance, comparing beta weights and squared structure coefficients along with *p* offers a more accurate depiction of the amount of the variance in the model as explained by each predictor. The use of both the structure coefficients and beta weights together assisted with determining the extent of variance was accounted for from the predictor variables. Effect sizes of the overall regression models were represented by R^2 to explain the variance accounted for in the dependent variable by all of the independent variables (Thompson, 1992).

Question 18 on the questionnaire asked individuals to make three recommendations regarding how their program could have better prepared them to teach students with autism. Responses to this question were analyzed qualitatively. Open coding was conducted by classifying responses according to broad categories of recommendations (e.g., behavior management and evidence based practices).

Results

Teacher Personal, Educational, and Professional Background Characteristics

Demographic and professional background characteristics showed that thirty-six novice AC special education autism teachers completed to the questionnaire. Data showed that most were female (88.9%), of Caucasian descent (83%), had a Bachelor's degree (66.7%), and taught at an elementary (33.3%) or middle school (33.3%). Educational Service Centers (ESCs) in Texas represented the most common route to certification (47.2%), followed by universities (25%) and other institutions (25%). In fact, the highest response rates were received from ESC's Region IV (30.6%), Region X (19.4%), and Region XIII (27.8%). Only 22.4% indicated completing one to four university or college credit hour courses pertaining to autism.

Of the novice AC special education teachers certified through an ESC or a private entity, 16.7% reported 0 to 12 clock hours of autism instruction. Approximately, 22% reported no formal instruction in autism, whereas 19.4% received 1 to 3 hours and 27.8% received 4 to 6 hours of instruction. Data on the method of instructional delivery showed that 38.9% percent of the respondents took online classes, 38.9% utilized a blended format and 22.2% took face-to-face classes. The majority of the participants (83.3%) completed internships as teachers of record.

Regarding professional development in autism at school, 25% special education teachers reported attending no workshops, 25% attended 1 to 2 workshops, 16.7% attended 3 to 5 workshops, and 33.3% attended 6 or more workshops. Most participants (72.2%) reported being sent by their school districts to ESC trainings for professional development. However, 27.8% reported being sent by their school districts to different providers (e.g., state conference in autism) for professional development. In the quest to attain autism knowledge, about 90% of the respondents engaged in self-directed learning. In fact, 58.3% devoted more than 6 hours, 22.3% spent 3 to 5 hours,

and 13.9% spent 1 to 2 hours of self-directed learning in autism. Only two people reported engaging in 0 hours of self-directed learning.

Results also showed that AC special education teachers had taught between 1 to 11 students with autism during the previous 2 school years. A majority (58.4%) of them taught between two to five students, whereas 11.1% taught 9 to 10 students and 13.9% taught 11 or more students. Only 8.3% of the respondents taught one student with autism. When asked to describe their previous experiences with individuals with autism, 52.8% selected some type of experience but the remaining 47.2% had none. The grouped selections included previous experience as a paraprofessional (16.7%); as a friend, paraprofessional, and substitute teacher (11.1%); as a friend (5.6%) and a substitute teacher (5.6%); as a friend and substitute teacher (5.6%); as a parent, friend, and substitute teacher (2.8%); as a paraprofessional and substitute teacher (2.8%); and as a parent and substitute teacher (2.8%).

Extent of Autism Knowledge of Novice AC Special Education Teachers

The autism knowledge of the novice AC special education teachers was assessed through Sections IV and V (items 30-50) of the questionnaire. The mean score was 61.53% (range, 0 to 91%) with a standard deviation of 20.22. One person scored 0. This score appears to be an outlier. The mean autism knowledge score excluding the 0 was 63.29% with a standard deviation of 17.50. Five respondents received scores in the 30s, four in the 40s, three in the 50s, six in the 60s, 12 in the 70s, three in the 80s, and two in the 90s. Overall, more participants (50.3%) scored between 60% and 79% and some (14%) between 80% and 99%. Thus, it appears that a majority of novice AC special education teachers indicated less than proficient knowledge about autism. Additionally, most respondents (88.9%) knew that the Texas Autism Supplement was required by the state for ARD meetings, however, four (11.1%) were unaware of the same.

Variables that Predict Autism Knowledge of Novice AC Special Education Teachers

Multiple regression models were generated using the dependent (i.e., autism knowledge scores) and the independent (predictor) variables (i.e., demographic, educational, and professional backgrounds of the novice AC teachers). The entire regression model (R^2) explained approximately 52% of the variance. Negative beta weights for age, students with autism, and professional development indicated smaller units of change with regard to the respondents' autism knowledge scores. The hours of self-directed learning resulted in the largest beta weight (β = .565), the largest squared structure coefficient (r_s^2= .780), and statistical significance (p = .009). In other words, the duration of time that respondents devoted to self-directed learning emerged as the largest predictor of autism knowledge (see Table 1)

A multi-way ANOVA was conducted with the autism knowledge score as the dependent variable with delivery of instruction (i.e., on-line or face-to-face), type of previous experience with individuals with autism, and current teaching assignment as the independent variables. The multi-way ANOVA and the partial eta-squared (η^2) revealed that 33% of the variance was explained by the respondents' previous experiences with an individual with autism. In addition, 17% of the variance was explained by the interaction effect of instructional delivery and current teaching assignment. These results were not statistically significant due to the small sample size. The effect size (η^2) denoted

practical significance between the groups, even though the sample size did not support statistical significance, however, the effect sizes were high (Cohen, 1992).

In general, the interaction effects showed that current life skills teachers in a self-contained setting who took blended classes (i.e., some online, some face-to-face) in the AC program, displayed the lowest autism knowledge scores in spite of previous experience as substitute teachers or paraprofessionals. Interestingly, instruction through blended classes and previous experience as substitute teachers did not seem to matter if for those who were parents of children with autism because they attained the highest autism knowledge scores. While attending only to the method of instructional delivery, respondents who took face-to-face classes had the smallest amount of variance in their knowledge scores (range, 70% to 79%). However, these respondents had higher autism knowledge scores if they had previous experience as paraprofessionals or substitute teachers.

Table 1: Beta Weights, Squared Structure Coefficients, and Significance Levels for Personal, Educational, and Professional Background

Variable	β	r_s^2	*P*
Age	-.198	.013	.286
Students with Autism	-.048	.005	.785
Credit Hours	.080	.020	.666
Formal Hours	.053	.020	.771
Professional Development	-.177	.122	.430
Hours of Self-directed Learning	.565	.780	.009*

Note. * indicates variable's statistically significance for $p < .01$.

Changes in AC Programs Recommended by Participants

Respondents were asked an open-ended question to identify three changes they would suggest to their AC programs for improving their knowledge regarding autism. The qualitative data indicated that the highest number of respondents recommended training for implementing evidence-based practices (e.g., applied behavior analysis, visual schedules, etc.) and skills in classroom and behavior management. In addition, respondents wanted to receive more hands-on experiences with students with autism, have specific training related to designing IEP goals and objectives, and learn techniques for including students in general education environments. Lastly, several respondents asked for specific training in floor time, the Picture Exchange Communication System (PECS), sensory integration, direct teaching, and social stories.

Discussion

The purpose of this study was to assess the autism knowledge of novice AC special education teachers to determine the extent to which demographic, educational

and professional factors predicted the variance in scores. Overall, demographic data showed that a majority of the respondents were female and taught in a suburban or rural area but not at a Title I school. These findings differ from previous findings where urban areas employed higher number of male teachers (Dai et al., 2007; Ng, 2000; Rosenberg et al., 2007; Schonfield & Fienman, 2012). In this study, participants ranged in age from 18 to 57 years, with most (81%) between 23 to 42 years, as was shown in Rosenburg's (2007) sample.

In this study, a power analysis (G*Power) was conducted to identify the number of respondents needed for utilizing parametric statistics. The small sample size is a threat to external validity and the results should be interpreted with caution. They cannot be generalized to the overall population of novice AC special education teachers; however if they could be, results would have depicted that the majority had low to average autism knowledge scores (range, 60% and 89%) with 13 (33.6%) in the poor range (30-57%) as per university standards.

Overall, the findings showed that the mean autism knowledge score (61.3%) of novice AC special education teachers was slightly lower than the mean score of 63% earned by healthcare workers in Nigeria (Bakare et al., 2009), but higher than the mean score of 56% earned by undergraduate medical, nursing, and psychology students in Nigeria (Igwe et al., 2010). While 44.5% of novice AC special education teachers received four or more hours of instruction, 41.4% received less than three or less hours of instruction in autism and inadequately prepared to teach these students. This is troubling because teachers of students with autism must be particularly knowledgeable regarding implementation of evidence-based practices (Simpson, Mundschenk, & Heflin, 2011). The implication is that AC special education teachers in Texas need to be better prepared in order to effectively teach this population, especially given the steadily increasing prevalence rate. During the 2014-15 school year, 49,799 students with ASD surpassed the rate of 43,228 children diagnosed with intellectual disabilities (TEA, 2015).

Previous research by Morgan and colleagues (1994) and Kretlow, Wood, and Cooke (2009) has demonstrated the effectiveness of peer coaching for improved performance of inservice teachers of students with special needs. AC programs in the state of Texas need to incorporate supervised teaching experiences as an integral component of professional development for sustained outcomes for both, teachers and students with autism. The current sample accrued more hours of teaching than is typical through clinical student teaching; however, it is not clear whether any of these teachers were supervised by peers or mentors skilled in implementation of evidence-based practices for individuals with autism.

When evaluating the extent to which personal, educational, and professional background factors predict autism knowledge scores, in this study, only one predictor, the amount of self-directed learning, demonstrated statistical significance. Seventy-five percent of the respondents received professional development but only 33% attended six or more workshops and 88.9% respondents engaged in self-directed learning. Respondents who spent more than 5 hours in self-directed learning were more likely to be moderately knowledgeable about autism. While the theory that self-directed learning is likely to increase basic knowledge, results showed that it may increase knowledge but is unlikely to increase highly specialized skills

(e.g., EBPs) that are crucial for improving student outcomes (Bellini, Henry, & Pratt, 2011; Morrier, Hess, & Hefflin, 2010; Schuermann, Webber, Boutot, & Goodwin, 2003). This lack of specific preparation leaves novice teachers vulnerable to the demands placed on them and are more likely to leave the profession within five years of employment (Barnhill et al., 2010; NRC, 2001) unless inservice and on-the-job coaching are provided (Kretlow & Bartholomew, 2010).

Implications for Policy and Practice

Given that AC programs are here to stay and that less qualified autism teachers are at-risk for failing or leaving the profession, AC programs in Texas need to: (1) provide basic and core content in autism to increase the knowledge of novice teachers on the characteristics and needs of students; (2) demonstrate instructional strategies that are considered to be evidence-based practice, and (3) specifically focus on the Texas Autism Supplement. AC programs need to provide frequent and quality hands-on experiences through a clinical internship to ensure that teachers are knowledgeable about autism and possess basic skills in effective instructional strategies. Higher levels of autism knowledge will not only increase the probability of serving this population more effectively but also improve teacher retention.

While novice AC special education teachers tend to receive most of their training prior to becoming certified, it appears that the responsibility of continuous professional development is in the purview of public school districts who hire these teachers. School districts must provide extensive well-designed induction training (Brownell, Sindelar, Kiely, & Danielson, 2010) with ongoing professional development in the area of autism if they intend to retain special education teachers. In addition, since most school districts provide professional development workshops that are topic specific, school districts should provide an array of workshops pertaining to the use of evidence-based practices for students diagnosed with autism (Scheuermann et al., 2003).

Limitations of the Study

The low survey response rate, despite the intensity of recruitment effort, is a limitation. The low response rate could be attributed to lack of desire on part of the directors of the AC programs to disseminate the survey link to their graduates. When contacted, many AC program directors expressed various types of concerns related to the topic of study. Some directly refused to forward the questionnaire link to their program participants.

One AC director of a very large program suggested that the research questions should be changed and should include assessment of autism knowledge of all teachers, not just of novice AC special education teachers. This director said that by focusing exclusively on novice AC special education teachers, the investigation aimed to identify potential problems with AC programs. Frequent electronic communication and in-person meetings did not appear to make a difference. This sentiment was echoed by several other AC program directors as well.

Second, the survey was distributed by invitation e-mail with the URL link close to the end of the school year. Data were collected for a period of 17 weeks and ended 2 weeks after school reopened for the new academic year. The timing might account for the low response rate (i.e., summer instead of spring or fall). Finally, even though the survey was distributed statewide, mainly teachers from three regional ESCs responded, suggesting that results may not

generalize to all the teachers in the state of Texas. Continuing this line of research with novice and veteran AC special education teachers is recommended for obtaining a complete assessment of their knowledge scores on autism.

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